REMARKS

Claims 1-7, 10-12, 15-23, 23, 26-28, 31, and 32 are rejected under 35 USC §103 as being unpatentable over Tan et al., U.S. 6,226,323, in view of Nguyen, U.S. 6,483,872

The Examiner's rejection is respectfully traversed.

Independent claims 1, 11, 13, 15, 17, 27, 29, and 31 have now been amended to recite that modified tentative decisions are used to subtract out an estimate of the intersymbol interference, and the second-filtered data produces an estimate of the intersymbol interference.

Tan et al. '323 describes a system for reducing the complexity of an adaptive decision feedback equalizer, for use in connection with a dual-mode QAM/VSB receiver system is described. QAM and VSB symbols, which are expressed in two's complement notation, include an extra bit required to compensate for a fixed offset term introduced by the two's complement numbering system. A decision feedback equalizer includes a decision feedback filter section which operates on symbolic decisions represented by a word length which excludes the added bit representing the offset. The vestigal word is convolved with the decision feedback filter's coefficients, while a DC component, corresponding to the excluded bit, is convolved with the same coefficient values in a correction filter. The two values are summed to provide an ISI compensation signal at the input of a decision device such as a slicer. A DC component representing a pilot tone in VSB transmission systems also introduces a DC component, and additional bits, to a VSB word length. These additional bits are similarly excluded and the vestigal representation convolved with coefficient values in a decision feedback filter. The DC component, including the pilot tone representation, is convolved with the same coefficient values in a correction filter.

Nguyen '872 describes a technique for reducing convergence time in a digital filter. When the digital filter is initially run, the coefficients in the digital filter are adjusted to reduce error in the output of the digital filter. When the adjusted coefficients meet a selected error level, these coefficients are stored in a memory and the digital filter filters data. The next time the digital filter is run, the stored coefficients are loaded into the digital filter and a number of iterations are run in which the coefficients are adjusted. Then, a determination is made as to whether the error level meets a threshold that may be the same as the selected error level. If the coefficients meet the threshold, the coefficients are stored in the memory and the filter is then used to filter data. A number of sets of coefficients may be stored in the memory and a set of coefficients unable to meet the threshold is replaced with another set of coefficients until the threshold is met or untested sets of coefficients are no longer present in the memory. At that time, a default set of coefficients may be used.

While it is suggested that Tan et al. `323 describes a procedure to anticausally filter tentative decisions, it does not causally filter tentative decisions. Rather, the system of Tan et al. '323 causally filters final (non-tentative) decisions. In column 24, lines 38-51, Tan et al. '323 explains that the decisions made during the most recent N time frames are tentative (i.e. non-final) because the surviving paths are not common, while the decisions made more than N time frames ago are final (non-tentative) because the surviving paths have common branches; this fact is well known to someone skilled in the art. In column 25, lines 4-20, Tan et al. '323 suggests that the N tentative decisions are processed by the second filter anticausally, while M+1 final decisions are processed by the second filter causally. Thus, Tan et al. '323 does not causally filter tentative decisions.

Note Nguyen '873 and Tan et al. '323 are silent regarding tentative decisions being used to subtract out an estimate of the intersymbol interference. Nguyen '873 does not even address this issue. Tan et al. '323 states that output of the FFE and negative input of the decision feedback filter (DFF) 202 are added. However, Tan et al. '323 also states that the DFF cancels only the tail portion of the channel impulse response using recovered data symbols. As stated in the rejection, the Examiner intended the DFF to correlate to the operation associated causally and anticausally filtering as recited in all independent claims. The output of the DFF does not produce an estimate of the intersymbol interference. In addition, the Examiner correlates the multi-level slicer of Tan et al. '323 to performing the operation generating modified tentative decisions as recited in the independent claims. The multi-level slicer 206, provides a signal decision, denoted x_dec, at one output and an error term, denoted "error", representing a vector difference between a valid, quantized constellation point and an actual received value. Decisions developed by the slicer 206 are further directed to the input of a decision feedback filter element (DFE) as a parallel signal denoted a DFE word, and identified as dfe_w. Intersymbol interference is not a vector difference between a valid, quantized constellation point and an actual received value.

The Examiner asserts that Tan et al. '323 states that the same tentative decision are processed by a set of "M+1 causal coefficients" in the second filter. As argued above, the M+1 decisions are final and not tentative. This is an important distinction. Note in FIG. 25, where the Examiner relied on this position, does not even suggest the use of a decision block for a filter arrangement to even comparable to what was recited in all the independent claims.

Also, Tan et al. '323 and Nguyen '872 are silent regarding its equalizer attempting multiple non-simultaneous passes through the data, each pass comprising both a first filter and a second filter. Note Tan et al. '323 does not describe each pass comprising both a first and a second filter. Therefore, Tan et al. '323 and Nguyen '872 does not render obvious independent claims 1, 11 15, 17, 27 and 31 respectively.

As to claims 2-7, 10, 12, 16, 18-23, 26, 28, and 32, they are dependent on claims 1, 11 15, 17, 27 and 31 respectively. Therefore, claims 2-7, 10, 12, 16, 18-23, 26, 28, and 32 are also allowable for the same reasons argued with respect to claims 1, 15, 11, 17, 27 and 31.

Claims 8, 13, 14, 24, 29, and 30 are rejected under 35 USC §103 as being unpatentable over Tan et al. '323 in view Nguyen '872 and Meehan, U.S. 6,115,419.

Meehan '419 describes a device for improving signal reception in a signal receiver. The device comprises a beamforming circuit and decision feedback equalizer circuit. The beamforming circuit includes two branches with each circuit branch having two feedforward equalizer circuit and an adder circuit.

Claims 13 and 29 have similar limitations as claims 1 and 17, respectively. However, claims 13 and 29 further recite that the first and second filter parameters are based on an estimate of the channel parameters. In addition, the received data comprises a plurality of received signals received over the plurality of data channels, and the equalizer further comprises a plurality of the first filter corresponding to the plurality of channels.

The arguments provided herein regarding claims 1 and 17 are also applicable to claims 13 and 29. Moreover, Applicants disagree that it would be obvious to have a plurality of data channels given Tan et al. '323's and Nguyen '872's deficiencies with respect to removing

intersymbol interferences (ISI) in a nonlinear manner. Furthermore, Meehan '419 does not address the deficiencies of Tan et al. '323 and Nguyen '872. Therefore, Applicants contend that the combination of Tan et al. '323, Nguyen '872, and Meehan '419 does not render obvious claims 13 and 29 because the deficiencies of Tan et al. '323 and Nguyen '872 argued with respect to claims 1 and 17 are not obvious to one of ordinary skill.

As to claims 14 and 30, it is dependent from claims 13 and 29. Therefore, claims 14 and 30 are also allowable for the same reasons argued with respect to claims 13 and 29.

Claims 8 and 24 are dependent on claims 1 and 17, and incorporate the limitations of claims 1 and 17, respectively. Meehan '419 does not address the deficiencies argued with respect to Tan et al. '323 and Nguyen '872 in claims 1 and 17. Thus, the combination of Tan et al. '323, Nguyen '872, and Meehan '419 does not render claims 8 and 24 obvious.

Claims 9 and 25 are rejected under 35 USC §103 as being unpatentable over Tan et al. '323 in view of Agazzi, U.S. 6,236,645.

Agazzi '645 describes a communication line having a plurality of twisted wire pairs connects a plurality of transmitters, one transmitter at each end of each twisted wire pair, with a plurality of receivers, one receiver at each end of each twisted wire pair.

Claims 9 and 25 are dependent on claims 1 and 17, and incorporate the limitations of claims 1 and 17, respectively. Agazzi '645 does not address the deficiencies argued with respect to Tan et al. '323 and Nguyen '872 in claims 1 and 17. Thus, the combination of Tan et al. '323, Nguyen '872 and Agazzi '645 does not render claims 9 and 25 obvious.

In view of the foregoing, Applicants respectfully submit that the cited prior art, taken alone or in the suggested combinations, does not support a *prima facie* case of obviousness under

the provisions of 35 USC §103. Accordingly, Applicants contend that the pending claims are patentable over the prior art of record, and an early indication of same is requested.

Respectfully submitted,

Reg. No. 33,298, 57

Matthew E. Connors
Registration No. 33,298
Gauthier & Connors LLP
225 Franklin Street, Suite 2300
Boston, Massachusetts 02110
Telephone: (617) 426-9180
Extension: 112